

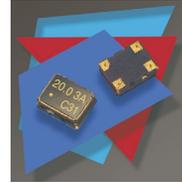
Ultra-Miniature Precision TCXO / VCTCXO



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Description

The Connor-Winfield 2.5x3.2mm Temperature Compensated Crystal Oscillators and Voltage Controlled Oscillators and Voltage Controlled Temperature Compensated Crystal Oscillators are designed for use in GPS applications requiring tight frequency stability over the -30 to 85°C or -40 to 85°C temperature range. Through the use of Analog Temperature Compensation, this device is capable of holding sub 1-ppm stabilities over the wide temperature range.



Applications

GPS Receivers

Features

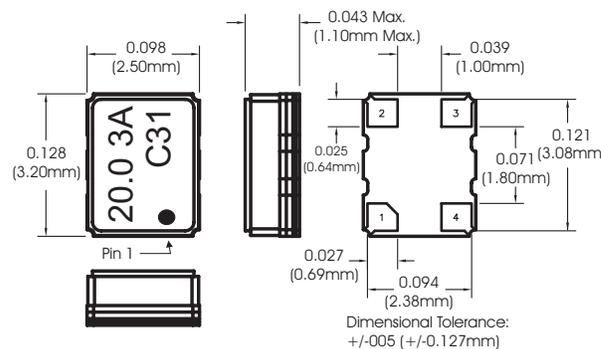
Model: Cxx - Series

2.5 Vdc, 2.8 Vdc or 3.3 Vdc Operation
Clipped Sinewave Output Logic
Ultra-Miniature 2.5x3.2mm SMT Package
Frequency Stabilities Available:
±0.50ppm, ±1.00ppm, ±1.50ppm or ±2.00ppm
Temperature Ranges Available:
-30 to 85°C or -40 to 85°C
Low Power <2mA
Low Jitter <1ps RMS
Tape and Reel Packaging
RoHS Compliant / Lead Free
Recommended for new designs

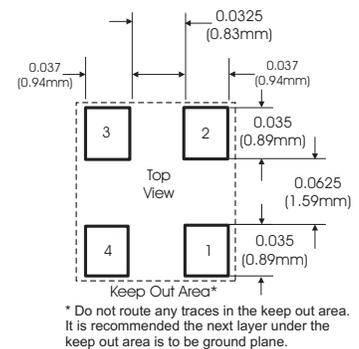
Pad Connections

1. VCTCXO - Control Voltage (Vc)
TCXO - N/C
2. Ground
3. Output
4. Supply Voltage (Vcc)

Package Layout



Suggested Pad Layout



Ordering Information

C	3	1	-020.0M
Oscillator Type Precision TCXO VCTCXO 2.5x3.2mm Package	Features 1 = TCXO, 2.5 Vdc, -30 to 85°C 2 = VCTCXO, 2.5 Vdc, -30 to 85°C 3 = TCXO, 3.3Vdc, -30 to 85°C 4 = VCTCXO, 3.3 Vdc, -30 to 85°C 9 = TCXO, 2.5 Vdc, -40 to 85°C 0 = VCTCXO, 2.5 Vdc, -40 to 85°C 7 = TCXO, 3.3Vdc, -40 to 85°C 8 = VCTCXO, 3.3 Vdc, -40 to 85°C A = TCXO, 2.8 Vdc, -30 to 85°C B = VCTCXO, 2.8 Vdc, -30 to 85°C C = TCXO, 2.8 Vdc, -40 to 85°C D = VCTCXO, 2.8 Vdc, -40 to 85°C	Frequency Stability 1 = ±0.50 ppm 2 = ±1.00 ppm 3 = ±1.50 ppm 4 = ±2.00 ppm	Output Frequency Frequency Format -xxx.xM Min.* -xxx.xxxxxM Max* *Amount of numbers after the decimal point. M = MHz



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Revision **08**
Date **28 Jan 2013**

Example Part Numbers:

C31-020.0M =2.5x3.2mm package, TCXO, 3.3 Vdc -30 to 85°C, ±0.50 ppm, Clipped Sinewave Output with an Output Frequency of 20.0MHz
C21-026.0M =2.5x3.2mm package, VCTCXO, 2.5 Vdc -30 to 85°C, ±0.50 ppm, Clipped Sinewave Output with an Output Frequency of 26.0MHz

Please consult the factory for available frequencies.



Model Specifications

Model Number	C11	CA1	C31	C21	CB1	C41	Notes
TCXO / VCTCXO	TCXO	TCXO	TCXO	VCTCXO	VCTCXO	VCTCXO	1
Supply Voltage (Vcc)	2.5 Vdc	2.8 Vdc	3.3 Vdc	2.5 Vdc	2.8 Vdc	3.3 Vdc	
Frequency Stability							±0.50 ppm
Operating Temperature Range							-30 to 85 °C
Model Number	C12	CA2	C32	C22	CB2	C42	Notes
TCXO / VCTCXO	TCXO	TCXO	TCXO	VCTCXO	VCTCXO	VCTCXO	1
Supply Voltage (Vcc)	2.5 Vdc	2.8 Vdc	3.3 Vdc	2.5 Vdc	2.8 Vdc	3.3 Vdc	
Frequency Stability							±1.00 ppm
Operating Temperature Range							-30 to 85 °C
Model Number	C13	CA3	C33	C23	CB3	C43	Notes
TCXO / VCTCXO	TCXO	TCXO	TCXO	VCTCXO	VCTCXO	VCTCXO	1
Supply Voltage (Vcc)	2.5 Vdc	2.8 Vdc	3.3 Vdc	2.5 Vdc	2.8 Vdc	3.3 Vdc	
Frequency Stability							±1.50 ppm
Operating Temperature Range							-30 to 85 °C
Model Number	C14	CA4	C34	C24	CB4	C44	Notes
TCXO / VCTCXO	TCXO	TCXO	TCXO	VCTCXO	VCTCXO	VCTCXO	1
Supply Voltage (Vcc)	2.5 Vdc	2.8 Vdc	3.3 Vdc	2.5 Vdc	2.8 Vdc	3.3 Vdc	
Frequency Stability							±2.00 ppm
Operating Temperature Range							-30 to 85 °C
Model Number	C91	CC1	C71	C01	CD1	C81	Notes
TCXO / VCTCXO	TCXO	TCXO	TCXO	VCTCXO	VCTCXO	VCTCXO	1
Supply Voltage (Vcc)	2.5 Vdc	2.8 Vdc	3.3 Vdc	2.5 Vdc	2.8 Vdc	3.3 Vdc	
Frequency Stability							±0.50 ppm
Operating Temperature Range							-40 to 85 °C
Model Number	C92	CC2	C72	C02	CD2	C82	Notes
TCXO / VCTCXO	TCXO	TCXO	TCXO	VCTCXO	VCTCXO	VCTCXO	1
Supply Voltage (Vcc)	2.5 Vdc	2.8 Vdc	3.3 Vdc	2.5 Vdc	2.8 Vdc	3.3 Vdc	
Frequency Stability							±1.00 ppm
Operating Temperature Range							-40 to 85 °C
Model Number	C93	CC3	C73	C03	CD3	C83	Notes
TCXO / VCTCXO	TCXO	TCXO	TCXO	VCTCXO	VCTCXO	VCTCXO	1
Supply Voltage (Vcc)	2.5 Vdc	2.8 Vdc	3.3 Vdc	2.5 Vdc	2.8 Vdc	3.3 Vdc	
Frequency Stability							±1.50 ppm
Operating Temperature Range							-40 to 85 °C
Model Number	C94	CC4	C74	C04	CD4	C84	Notes
TCXO / VCTCXO	TCXO	TCXO	TCXO	VCTCXO	VCTCXO	VCTCXO	1
Supply Voltage (Vcc)	2.5 Vdc	2.8 Vdc	3.3 Vdc	2.5 Vdc	2.8 Vdc	3.3 Vdc	
Frequency Stability							±2.00 ppm
Operating Temperature Range							-40 to 85 °C

Absolute Maximum Ratings

Parameter	Minimum	Nominal	Maximum	Units	Notes
Storage Temperature	-40	-	85	°C	
Supply Voltage (Vcc)	-0.5	-	6.0	Vdc	
Input Voltage (Vc)	-0.5	-	Vcc+0.5	Vdc	



Operating Specifications

Parameter	Minimum	Nominal	Maximum	Units	Notes
Center Frequency	10	-	40	MHz	
Frequency Calibration @ 25 °C	-1.0	-	1.0	ppm	2
Supply Voltage Variation (Vcc±5%)	-0.025	-	0.025	ppm	
Load Coefficient (±5%)	-0.025	-	0.025	ppm	
Aging per year	-1.0	-	1.0	ppm	
Static Temperature Hysteresis	-0.4	-	0.4	ppm	3
Frequency shift after reflow soldering	-1.0	-	1.0	ppm	
Supply Voltage (Vcc)					
2.5 Vdc Models	2.375	2.500	2.625	Vdc	
2.8 Vdc Models	2.660	2.800	2.940	Vdc	
3.3 Vdc Models	3.135	3.300	3.465	Vdc	
Supply Current (Icc)	-	-	2	mA	
Period Jitter	-	3	5	ps rms	
Integrated Phase Jitter (BW=12 Khz to 20 MHz)	-	0.3	1.0	ps rms	
Typical SSB Phase Noise for 26 MHz					
@ 10Hz offset	-	-80	-	dBc/Hz	
@ 100Hz offset	-	-110	-	dBc/Hz	
@ 1KHz offset	-	-130	-	dBc/Hz	
@ 10KHz offset	-	-145	-	dBc/Hz	
@ 100KHz offset	-	-150	-	dBc/Hz	
Start-up Time	-	-	10	ms	

Control Voltage Characteristics

Parameter	Minimum	Nominal	Maximum	Units	Notes
Control Voltage (Vc)					
2.5 Vdc Models	0.2	1.2	2.2	V	4
2.8 Vdc Models	0.4	1.4	2.4	V	4
3.3 Vdc Models	0.5	1.5	2.5	V	4
Frequency Pullability @ 25°C	±10	-	-	ppm	
Control Slope		Positive Slope			
Monotonic Linearity	-	-	±5	%	
Input Impedance	50K	-	-	Ohm	
Modulation Bandwidth (3dB)	10	-	-	KHz	

Clipped Sinewave Output Characteristics

Parameter	Minimum	Nominal	Maximum	Units	Notes
Load		10pF // 10 KOhm			5, 6
Output Voltage	1.0	-	-	V peak to peak	7

Package Characteristics

Package	Hermetically sealed ceramic package and metal cover
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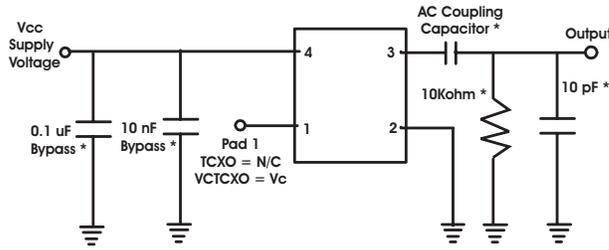
Environmental Characteristics

Vibration:	Vibration per Mil Std 883E Method 2007.3 Test Condition A
Shock:	Mechanical Shock per Mil Std 883E Method 2002.4 Test Condition B.
Soldering Process:	RoHS compliant lead free. See soldering profile on page 4.

Notes:

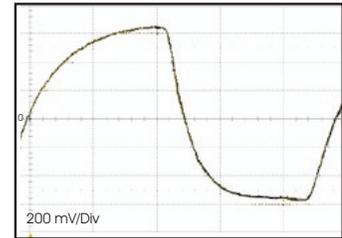
1. Frequency stability vs. change in temperature $[\pm(F_{max}-F_{min})/(2*F_0)]$, Vc = nominal control voltage for VCTCXO models.
2. Initial calibration @ 25°C, Vc = nominal control voltage for VCTCXO models. Specification at the time of shipment after 48 hours of operation.
3. Frequency change after reciprocal temperature ramped over the operating range. Frequency measured before and after @ 25°C.
4. For best application performance, careful selection of an external power source is critical. Select an external regulator that meets or exceeds to following specifications regarding voltage regulation tolerance, initial accuracy, temperature coefficient, voltage noise, and low voltage noise density. Factory Test Conditions: Initial Accuracy ±2mv, Noise (0.1Hz to 10 KHz) 15uV p-p, Voltage Noise Density = 50nV/sqrt Hz, Temperature Coefficient < 5ppm/°C.
5. Attention: To achieve the frequency stability specified it is required that the circuit connected to this TCXO output must have the equivalent input capacitance that is specified by the nominal load capacitance. Deviations from the nominal load capacitance will have a graduated effect on the stability of approximately 20ppb per pF load difference.
6. Load capacitor, load resistor, coupling capacitor and by pass capacitors are required components to insure proper operation of this TCXO / VCTCXO.
7. Output is DC coupled.

Test Circuit

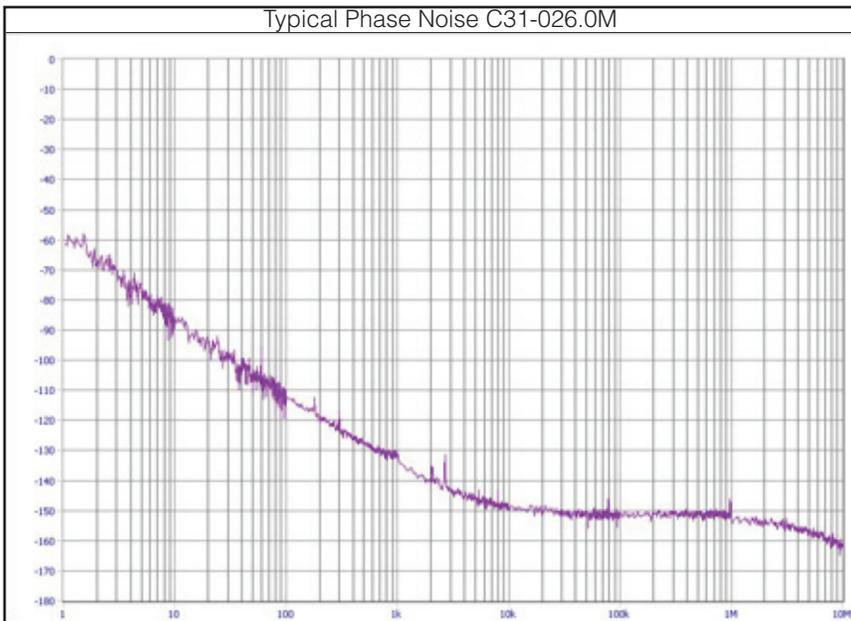


* Required components to insure proper operation.

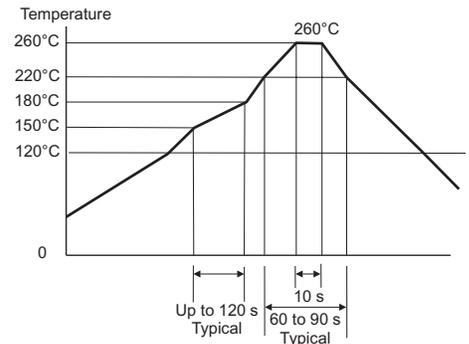
Output Waveform



Typical Phase Noise Plot

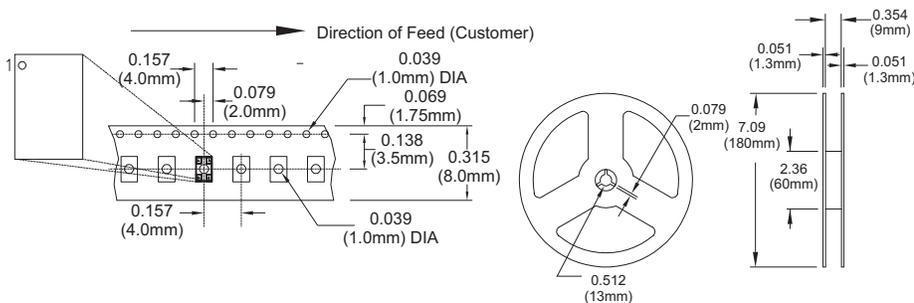


Solder Profile



Meets IPC/JEDEC J-STD-020C

Tape and Reel Information



Marking Information



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